

REMARKS

In the Official Action, the Examiner rejected claims 1-8 under 35 U.S.C. §102(b) as being anticipated by both JP 2001-315256 and Ohta et al., WO 01/28767 (with the Examiner referring to the corresponding U.S. Patent No. 6,998,455). For both of these rejections, the Examiner asserted that the cited documents disclose a laminate having two metal layers and a thermoplastic polyimide which the Examiner has contended would inherently possess the claimed characteristics.

By the present Amendment, claim 1 has been amended to define one aspect of the present invention with greater precision by incorporating the recitations previously found in claim 2 and claim 2 as well as claim 7 (which depended from claim 2) have been cancelled without prejudice or disclaimer. Applicants respectfully maintain that the claims now of record are neither anticipated by nor obvious over the cited prior art.

As explained in greater detail in the specification, one aspect of the present invention relates to a polyimide metal laminate comprising a copper foil and a stainless steel foil or stainless steel foils formed on both sides of a polyimide resin. The polyimide resin which comes in contact with the recited foil has certain defined characteristics, particularly:

- 1) a heat resistance temperature of not less than 350°C;
- 2) a coefficient of humidity expansion at 32°C of from 1 to 20 ppm/%RH;
- 3) an average value of the etching array by a 50 wt. % aqueous solution of potassium hydroxide at 80°C of not less than 1.0 mm/min; and
- 4) a peel strength after heating at 350°C for 60 minutes of not less than 1.0 kN/m.

The polyimide resin is further defined as being a thermoplastic polyimide obtained by reacting a diamine with a tetracarboxylic dianhydride, the tetracarboxylic acid dianhydride being obtained by combining at least one kind of tetracarboxylic acid dianhydride selected from pyromellitic acid dianhydride, p-(phenylene bis(trimellitic acid monoester anhydride)), 3,3'4,4'-ethylene glycol dibenzoate tetracarboxylic acid dianhydride and 2,2-bis(4-hydroxyphenyl)propane-3,3',4,4'-benzophenone tetracarboxylic acid dianhydride with 3,3',4,4'-benzophenone tetracarboxylic acid dianhydride. Furthermore, the 3,3',4,4'-benzophenone tetracarboxylic acid dianhydride is present in an amount not less than 5 mole % and not more than 50 mole % of the total tetracarboxylic acid dianhydride. Other aspects of the invention are set forth in the dependent claims.

To provide a further understanding of the present invention, the Examiner's attention is respectfully directed to the illustrative and comparative examples starting on page 19 of the specification. For instance, as may be seen from Table 1 and Tables 3, 4 and 5, when following the teachings of the present invention, the defined heat resistance temperature, coefficient of humidity expansion, etching rate and peel strength can be obtained. However, as set forth in Table 2 and in Comparative Examples 1-3 provided in Table 6-8, when the teachings of the present invention are not followed, inferior results are obtained. For example, when the defined amount of the 3,3',4,4'-benzophenone tetracarboxylic acid dianhydride (BTDA) is not used, one or more of the recited characteristics in claim 1 are not attained. Furthermore, as stated at the bottom of page 27, when the laminates of Comparative Examples 1-3 were used as suspensions for hard disks, the etching rate of the polyimide was slow and the shape of the polyimide deviated from the set value so that it was not

possible to prepare a suspension with the required shape. In contrast, the polyimide metal laminates of the present invention can exhibit superior dimensional stability relative to a change in temperature and a change in humidity such as can be encountered when processing the laminate. Accordingly, it is possible to cope with part mounting at a high temperature and ultrafine processing can be achieved while maintaining a high etching rate in an alkaline solution thereby enhancing productivity.

Based on the discussion set forth above and the evidence of record, applicants respectfully submit that the presently claimed invention cannot be rejected over the cited prior art. The JP '256 publication describes a flexible metal foil-clad laminate comprising at least one type of metal foil, a thermoplastic polyimide layer and a heat resistant base film. The polyimide layer is made of a thermoplastic polyimide having a defined glass transition temperature and water absorption ratio and/or the base film is made of a non-thermoplastic polyimide film having a defined water absorption ratio or a thermoplastic polyimide film having a defined glass transition temperature and water absorption ratio. The disclosed flexible metal foil-clad laminate can be used for a hard disk suspension. In Example 1, a polyimide resin is obtained by using 3,3',4,4'-benzophenone tetracarboxylic acid dianhydride and 3,3',4,4'- ethylene glycol dibenzoate tetracarboxylic acid dianhydride. However, the amount of the BTDA is more than 50 mole % and therefore does not meet the amount recited in amended claim 1. Furthermore, the evidence provided in the specification, such as Polyimide J in Table 2 which uses more than 50 mole % of BTDA provides inferior results as illustrated in Tables 6-8 which confirms that the specific characteristics recited in claim 1 are not inherently met. In this latter respect, the Examiner is aware that in order to properly rely on the principle of "inherency",

the asserted inherent feature must always be present and this has been shown not to be the case in the present situation.

With respect to the rejection based on Ohta et al., this document relates to a laminate which is said to provide changes in dimension to such a small extent as to not cause curling and warpage when the ambient humidity changes and which is said to be useful for flexible printed wiring boards. The laminate comprises a polyimide layer or layers of polyimides formed of a conductor by coating and at least one of the polyimide layers is composed of a polyimide of low hygroscopic expansion obtained by the reaction of diamines containing 20 mole % or more of 4,4'-diamino-2'-dimethylbiphenyl with a tetracarboxylic acid compound and exhibiting a defined coefficient of linear hygroscopic expansion. The tetracarboxylic acid compounds are set forth starting at column 5, line 65 and, as set forth in column 11, pyromellitic dianhydride, 3,3',4,4'-biphenyltetracarboxylic acid dianhydride and 4,4'-(hexafluoroisopropylidene)diphthalic acid dianhydride are used in the Examples.

Similar to what was stated above with regard to the JP '256 publication, Ohta et al., does not teach the presently claimed invention with the defined amount of BDTA nor does the document in any way recognize the importance of this material in obtaining the characteristics recited in claim 1. In this respect, the Examiner's attention is respectfully directed to Polyimide I in Table 2 of the present application wherein BDTA is omitted, but the combination of pyromellitic dianhydride and 3,3',4,4'-biphenyltetracarboxylic acid dianhydride (two of the dianhydride materials used in the examples of Ohta et al.) are used in combination and, as set forth in Tables 6-8, provide results which are inferior to those which can be obtained in

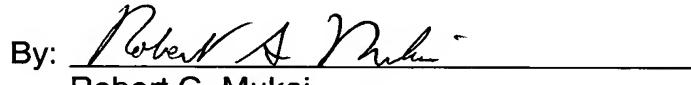
accordance with the present invention. Thus, applicants have again shown that the characteristics recited in claim 1 are not inherent in the teachings of Ohta et al..

For all of the reasons set forth above, applicants respectfully submit that the claims now of record are patentable in all regards and therefore request reconsideration and allowance of the present application.

Should the Examiner have any questions concerning the subject application, the Examiner is invited to contact the undersigned attorney at the number provided below.

Respectfully submitted,

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